Towards a process theory of entrepreneurial ecosystems

Towards a Process Theory of Entrepreneurial Ecosystems

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Abstract

Entrepreneurial ecosystems have emerged as a popular concept within entrepreneurship policy and practitioner communities. Specifically, they are seen as a regional economic development strategy based around creating supportive environments that foster innovative startups. However, existing research on entrepreneurial ecosystems has been largely typological and atheoretical and has not yet explored how they influence the entrepreneurship process. This paper critically examines the relationships between ecosystems and other existing bodies of work such as clusters and regional innovation systems. Drawing on this background, the paper suggests that a process-based view of ecosystems provides a better framework to understand their role in supporting new venture creation. This framework is used to explain the evolution and transformation of entrepreneurial ecosystems and to create a typology of different ecosystem structures.

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1. Introduction

Although not new, the idea of entrepreneurial ecosystems (EE) has rapidly gained currency within entrepreneurship practitioner and research circles. Ecosystems are a conceptual umbrella for the benefits and resources produced by a cohesive, typically regional, community of entrepreneurs and their supporters that help new high-growth ventures form, survive, and expand. However, academic research on EE has lagged popular interest, leading to the term becoming a chaotic conception characterized by little systematic and consistent empirical evidence and few theoretical frameworks (Sayer 1992). As Stam (2015) argues, this leads to a situation of policy leading theory rather than theory informing policy and practice. There is a risk of limiting an otherwise fertile research field due to a lack of conceptual rigor, in which research is confined to identifying best practices rather than

exploring the broader relationships between context and entrepreneurial strategy within modern capitalism.

In response to this challenge, this paper makes the following contributions to the growing ecosystems literature: First, we demonstrate that the study of EE is a unique domain, distinct from related work on clusters and regional innovation systems. Second, we develop a process perspective on EE, in which ecosystems are viewed as ongoing processes of the development and flow of entrepreneurial resources such as human and financial capital, entrepreneurial know-how, market knowledge, and cultural attitudes. The presence and circulation of these resources helps explain how ecosystems evolve and transform over time and allows us to distinguish between strong, well-functioning ecosystems and weaker, poorly-functioning ones. Third, we show that a process perspective on ecosystems provides a more nuanced approach to how ecosystems operate and influence the entrepreneurship process, which can lead to more effective policy interventions.

2. **Entrepreneurial Ecosystems in Context**

The EE concept emerged out of the changing debates about entrepreneurship in the 1980s and 1990s. Scholars increasingly questioned the value of personality-based explanations of entrepreneurship in favor of investigations into the broader social and economic structures surrounding the entrepreneurship process (Dodd and Anderson, 2007). As part of this shift, early works such as those of Dubini (1989), van de Ven (1993), and Spilling (1996) explored the influence of regional social, cultural, political, and economic structures on the entrepreneurship process. This stream of research conceptualized a social and economic context surrounding, supporting, and influencing entrepreneurs (Malecki, 1997; Neck et al., 2004).

Two sources have driven the recent popularity of EE within practitioner and policy communities: Daniel Isenberg's (2010) work in the *Harvard Business Review* and Brad

Feld's (2012) book *Startup Communities.* Both authors highlight the importance of community, in terms of the various actors that support the entrepreneur emotionally and financially, and the education, policy, and economic environments that provide resources for new ventures. Groups such as the World Economic Forum (2013), the Kauffman Foundation (Motoyama et al., 2014), and the OECD (Mason and Brown, 2014) have embraced this approach as a new economic development strategy. This has been followed by a wave of academic research focused on establishing the attributes of successful ecosystems and exploring how they support high-growth entrepreneurship (Acs et al., 2014; Alvedalen and Boschma, 2017; Audretsch and Belitski, 2016; Auerswald, 2015; Autio et al., 2014; Mack and Mayer, 2015; Motoyama and Knowlton, 2016; Qian, 2016; Spigel, 2017; Stam and Bosma, 2015; Stam and Spigel, 2016).

The main argument of this recent work is that the characteristics of a successful ecosystem enable entrepreneurs to identify untapped market niches and draw on the local resources, support, and financing to grow new ventures into globally competitive firms. This differs from prior approaches to regional entrepreneurship policy which sought to increase the overall startup rate rather than focus specifically on high-growth entrepreneurship. This focus on entrepreneurial growth in the ecosystems literature can be seen as a way of realizing an entrepreneurship policy based on 'picking winners' rather than providing economically inefficient blanket support for new firm creation without the implicit contradiction in expecting policy makers to second-guess the market (Storey 2005).

A widespread theme in the existing literature is defining the necessary economic and social conditions for a strong entrepreneurial ecosystem. While there is not yet a single agreed-upon definition or typology of ecosystems, Spigel (2017) suggests that while there may be disagreement about the exact mixture of elements constituting an entrepreneurial ecosystem, they can be broadly categorized as cultural, social, or material. Cultural elements represent

the attitudes towards entrepreneurship that can normalize the risks of entrepreneurship or create barriers to leaving stable employment to become an entrepreneur (Fritsch and Storey, 2014). Such cultures are associated with the presence of success stories about other local entrepreneurs, legitimizing entrepreneurial activity. These cultures and histories increase the willingness of entrepreneurs and other actors to engage in the risks associated with innovative entrepreneurship, while other cultural structures can discourage these kinds of activities (Aoyama, 2009).

However, a supportive culture is not enough to sustain long-term entrepreneurial development. Entrepreneurs need to draw on resources such as risk capital, talented workers, and mentorship from experienced entrepreneurs as they start and scale new ventures. These resources can be termed 'social' because they are primarily accessed through social networks. Dense social networks within regions have long been seen as a key criterion of entrepreneurship and innovation because they support the circulation of knowledge about new opportunities, new technologies, and the entrepreneurship process more generally (Hoang and Antoncic, 2003). Strong networks connect entrepreneurs with two key resources necessary for venture growth: investment and employees. Angel investors and venture capitalists use their own social networks to vet and evaluate potential investments (Powell et al., 2002), and entrepreneurs use their networks to identify talented workers with the right skills to thrive in a high-growth startup (Wapshott and Mallett, 2016). They also allow entrepreneurs to learn from each other, helping them to avoid common pitfalls associated with growth (Aldrich and Yang, 2014).

Finally, material attributes are the institutions and organizations rooted in a particular place that support high growth entrepreneurship. This includes physical entities such as research universities and other support organizations (e.g. incubators or accelerators), specialized firms that focus on startup needs, or a region's physical telecommunications and

office infrastructure (Patton and Kenney, 2005). It also includes more amorphous factors like public policies tied to a place that supports entrepreneurship through direct financing or training activities as well as the strength of the local market that entrepreneurs can sell into. Material attributes encompass both government-sponsored programs such as incubators and entrepreneurship training centers and more informal institutions such as legal rights and open markets (Bathelt and Glucker, 2011)

3. Conceptual Antecedents of Entrepreneurial Ecosystems

To date there is little empirical evidence to establish the relative importance or role of these attributes or to place them in a larger conceptual framework. While the recent interest in ecosystems has been largely atheoretical, it draws heavily on major research traditions in entrepreneurship, economic geography, and regional science, particularly areas such as industrial clusters and regional innovation systems. These traditions apply different perspectives to approach the same issue: the connections between the entrepreneurship process and localized economic and social contexts. Exploring the connections between the EE literature and these schools of thought allows for the creation of a more rigorous and complete theoretical foundation for the continued study of EE and creates a logic to connect ecosystem's structures with their outcomes.

3.1 Industrial clusters

Contemporary work on EE is closely linked with clusters. Both Feld and Isenberg explicitly cite Porter's (1998) work on clusters. Both the clusters and ecosystems literatures build on Marshall's (1920) core argument: there are forces outside an organization but within a region that contribute to firms' competitive advantage. Firms' productivity and competitiveness are enhanced by the presence of multiple competing and cooperating firms that are either in the same industry or that share a common technological base. Clusters increase the competitiveness of new ventures in two ways. First, the presence of many firms

in the same sector or supply chain helps to attract or train a large pool of specialized and skilled workers (Glaeser and Kerr, 2009). This allows smaller and resource-poor firms to access a specialized workforce, helping them either reduce costs or increase their innovative potential (Capello, 2002).

Second, knowledge and capabilities that build up in a cluster through knowledge spillovers from other firms and universities help new ventures access cutting-edge technologies and non-public market information (Henry and Pinch, 2001). Beyond such spillovers, clusters act as a catalyst for entrepreneurial activity in a more direct way by providing the opportunities and resources that entrepreneurs require to create new ventures (Rocha and Sternberg, 2005). Clusters create supportive environments for entrepreneurship by "enabling better access to a more diverse range of inputs and complementary products" (Delgado et al., 2010 p. 496). In clusters with strong local supply chains, entrepreneurs can find new niches to serve and draw on a skilled labor force unavailable in other places (Glaeser et al., 2010). In more diverse clusters, entrepreneurs can integrate multiple sources of knowledge to identify previously unobserved opportunities.

Entrepreneurial ecosystems build on three principles of cluster theory. First, the presence of other firms—be they in the same or different sectors—is a source of competitive advantage for new ventures: Entrepreneurs can leverage their connections with nearby firms to gather market intelligence, find initial customers, or insert themselves into existing supply chains. Second, work on EE has incorporated cluster theories to emphasize the importance of entrepreneurs drawing on knowledge outside of the firm to increase their competitiveness. Third, ecosystem theory develops from cluster perspectives that acknowledge knowledge processing and creation as a core component of firms' success in modern economies and that this is aided by close physical proximity between firms.

3.2 Regional innovation systems

While fewer ecosystem researchers have invoked regional innovation systems (RIS), ecosystem thinking clearly draws on this tradition. The RIS concept seeks to explain the institutional and policy foundations of the heterogeneous geography of innovation within regions. Cooke et al. (1997) divide RIS into its three basic components: region, innovation, and system. The region is a container for innovative activity, due to the geographic 'stickiness' of knowledge, networks, and workers, as well as an active participant in the innovation process though policy initiatives. Innovation is seen through a neo-Schumpeterian lens as the novel recombination of different sources of knowledge (Cooke, 2001). This innovation does not happen solely within a firm; innovative firms draw on knowledge produced by large anchor organizations like universities and research laboratories as well as other firms within and outside of their own sector. RIS policies seek to increase regional innovative capacity by supporting anchor knowledge producers and supporting learning between firms. Finally, 'system' refers to the fact that the discrete elements of RIS work in concert with one another, creating self-perpetuating cycles of innovation and economic growth.

As with clusters, social networks among entrepreneurs, innovators, and researchers are critical elements of a RIS and mediate access to the most important resources for innovation, such as unique knowledge. Entrepreneurs with larger and more diverse networks are better positioned to identify opportunities in the marketplace (Anderson and Miller, 2003), absorb new ideas (Powell et al., 2005), and have better access to risk capital (Shane and Cable, 2002). As with clusters, these networks have a local bias: the frequent interaction allowed by geographic proximity allows entrepreneurs and other actors to build up strong local networks that contain numerous ties that provide access to unique resources (Westlund and Bolton, 2003). A supportive culture normalizes networking activities within a region, helping to support knowledge spillover and cooperation. (Doloreux and Parto, 2005) .

Cooke (2007) subsequently developed the notion of an Entrepreneurial Regional Innovation System (ERIS). ERIS are differentiated from traditional RIS by the presence of pools of venture capital, market-focused serial entrepreneurs, and disruptive innovation driven by strong internal networks rather than external supply chains. Unlike traditional RIS, which have a central 'anchor' like a large multinational firm, university, or research lab, ERIS lack a centralized actor to coordinate knowledge flows and instead depend on entrepreneurial actors to create their own networks and institutions (Ylinenpää, 2009).

The EE literature draws on three core RIS and ERIS concepts. First is the role of networks, which stems from the socially embedded nature of entrepreneurship: entrepreneurs need to be able to gather knowledge and learn from a variety of sources in order to identify an opportunity and gather the resources they require to create a new venture to exploit that opportunity (Nijkamp, 2003). RIS research emphasizes that these networks are embedded in larger social, political, and economic contexts and power relations (Christopherson and Clark, 2007). Much like innovation systems, EE are socially situated within their regional context. The formation of networks that underlie interactive learning and innovation in EE depends on these informal cultural outlooks. Second is the importance of universities and other anchor organizations in innovation as key sites of knowledge production and workforce training. These organizations produce cutting-edge scientific developments which spillover to over to nearby firms and act as training grounds for new generations of skilled entrepreneurs and workers and as magnets to attract highly educated workers to the region (Huffman and Quigley, 2002). Third is the role of policy in creating a supportive environment for innovative entrepreneurship. While public investments cannot themselves drive commercializable innovation, they can help create the preconditions necessary for this innovation to occur (Asheim et al., 2007). Similarly, while different types of government support such as funding, training, and providing specialized experience can encourage

entrepreneurship, these policies cannot alone generate a vibrant and self-supporting ecosystem (McQuaid, 2002).

4. What's New About Entrepreneurial Ecosystems?

Cluster and RIS concepts provide well-researched frameworks to understand why some places enjoy persistently higher rates of high-growth entrepreneurship than others. The sharing of resources and knowledge between firms in a cluster or the regional policies and innovation structures that constitute an RIS provide important clues about how regions can support high-growth entrepreneurship. This raises the question of what is fundamentally new about entrepreneurial ecosystems. If ecosystems are simply a re-formation of existing theories then what is the point in introducing a new term? The promise of EE as a distinct concept is that it addresses weaknesses in how cluster and RIS theories approach entrepreneurship and focuses on the unique needs and trajectories of innovative high-growth ventures rather than of all firms in a region. There are three fundamental ways that ecosystems research improves on existing conceptions of business clusters and systems to better explore the phenomenon of highly entrepreneurial regions.

First, clusters and RIS are often defined by the specific resources they contain, such as skilled workers and specialized knowledge. As argued in these literatures, a strong pool of talented workers and spillovers of technical knowledge from nearby universities and anchor firms helps support the competitive advantage of local firms. By accessing these resources, firms are able to increase their innovative and productive potential. But from an ecosystems perspective it is important to consider the ability of entrepreneurs to access these resources. For example, it is not clear that new ventures benefit as much as their more established counterparts from knowledge spillovers due to their lower levels of absorptive capacity and internal capabilities (Liao et al., 2003). This reduces the importance, for example, of local universities as a source of novel innovation. Similarly. local social networks are not

homogeneous and newer entrepreneurs may lack the social capital to integrate into them (McAdam et al. under review; Jack, 2005). Finally, startups require more than just skilled workers; these workers must be also be able to work in the unique environment of high-growth ventures, which are often characterized by less structure and more onerous conditions and of employment than similar jobs within larger companies in order to quickly develop new products (Neff, 2012). This requires the cultural normalization of particular work habits and career goals within a substantial subset of the working population.

Ecosystems also signal a similar shift in how we understand the role of knowledge in the entrepreneurship process. Market and technical knowledge is seen as a wellspring of entrepreneurial innovation within the cluster and RIS literature,. Within the context of EE we must also include a third type of knowledge: *knowledge about the entrepreneurial process itself*. This involves skills such as opportunity identification, business planning, and pitching for investment but also extends to the cultural norms regarding how an entrepreneur should act and present themselves to others as part of the legitimation building process (de Clercq and Voronov, 2009). Some of this knowledge is acquired through entrepreneurship training or through learning from books and websites on entrepreneurship. But it is also developed through new entrepreneurs' interactions with more experienced founders or business mentors, working at other startups, and general immersion in a region's entrepreneurial culture (Aldrich and Yang, 2014). This knowledge helps entrepreneurs anticipate and overcome challenges inherent in the venture creation process such as developing new products, finding initial customers, and growing their firms under severe resource constraints.

Second, recent interpretations of ecosystems such as those advanced by Feld and other practitioners stress that the ecosystem ought to be led by entrepreneurs themselves (Stam, 2015). While this is a normative perspective based on Feld's observations of Boulder, Colorado's entrepreneurial ecosystem, it aligns with Lerner's (2009) argument that lack of

knowledge about entrepreneurship by policymakers is a major barrier to effective state support of entrepreneurship and ERIS theories about the role of the entrepreneur as creators of supportive networks and institutions. From this perspective, entrepreneurs are the best group to identify the issues that should be addressed through public intervention. This departs from the traditional top-down policy approaches common to clusters or RIS approaches. This is not to say that the state has no role in ecosystems: there are issues such as talent development and lack of local investment capital which only they state can systematically address. However, EE suggest the need for a different relationship between the state and the entrepreneurial community, with the state adopting a more facilitative role rather than directly coordinating entrepreneurial networks and support activities.

A final difference between cluster and RIS research and EE is the role of industrial sectors. Cluster and RIS frameworks are primarily concerned with the flows of technical knowledge within a particular industrial sector or between sectors that spur innovation. However, ecosystem research has remained largely industry agnostic. While ecosystem research has generally focused on technology ventures, this does not presuppose a particular sectoral focus. The benefits of an ecosystem do not necessarily accrue to firms in the same market or supply chain as they do in clusters but to a broad array of high-growth ventures to the importance of entrepreneurial rather than industry-specific knowledge and resources within an ecosystem. For example, the experiences a biotech entrepreneur has had in scaling up her business, such as their techniques for hiring and retaining the best workers, building a successful organizational culture, and interacting with investors, can inform the strategies of entrepreneurs in unrelated sectors. Though there are substantial differences in firm lifecycle and investment strategy between biotech and digital technology or consumer product sectors, there are still important lessons that entrepreneurs in these sectors can learn from each other within ecosystems.

This cooperation and mutual learning is enabled by the lack of competition between startup firms in many ecosystems. Case studies of ecosystems (e.g. Mack and Mayer, 2015; Motoyama and Knowlton, 2016) have not identified high levels of direct competition between local firms. Startup firms in an ecosystem are more likely to share a common technology (e.g. cloud computing) rather than clients. While there are some ecosystems that have a high degree of competition between startups—for example the multiple oil and gas technology startups in Calgary—these appear to be less common than industry-agnostic ecosystems (Spigel, 2017). The lack of direct competition between startups in an ecosystem creates a tension with Porter's (1998) emphasis on competition as a leading driver of competitiveness within regional clusters. However, startups in an ecosystem still face global competition from other firms even if they are not directly competing against their local peers. In this way they can benefit from interactive entrepreneurial learning in a trust-based environment while still being refined by global competition.

As shown in Table 1, there are substantial differences between existing concepts of clusters and RIS and ecosystems. These differences are the result of the specific focus of ecosystems on the particular situation of entrepreneurs and new ventures: they require different types of knowledge and support than older and more established firms and they acquire the resources they need through different means. The causal link in clusters and innovation systems between location and firm competitiveness flows from either the creation of economies of scale and scope within a region or the stickiness of tacit knowledge that binds it to a place. The functioning of ecosystems emerges out of the logic of the socially embedded nature of the entrepreneurship process that involves a wide array of actors, resources, and capabilities. This creates the need for new theories that specifically address these issues to better understand the heterogeneous geography of innovative entrepreneurship. In particular, there is a need for an improved understanding of the

processes through which ecosystems support high growth startups and by which ecosystems build and change over time. The processes driving clusters and regional innovation systems — economies of scale, economies of scope, and knowledge spillovers - do not adequately explain the functionality of ecosystems.

*****Table 1 around here*****

5. **Process Perspectives of Entrepreneurial Ecosystems**

As argued above, while existing theories such as clusters and RIS provide important insights into ecosystems, they have significant gaps their ability to fully explain the sustained ability of some regions to produce high-growth entrepreneurial ventures. This leaves space for the development of new theories specifically aimed at understanding this phenomenon, namely, entrepreneurial ecosystems. However, current use of EE lacks historical or contextual sensitivity. It can be seen as a chaotic conception that arbitrarily divides the indivisible and/or lumps together the unrelated and the inessential (McAdam et al., In review) Following Sayer (1992), chaotic conceptions can be used without difficulty both in everyday life and in scientific practice for descriptive purposes. However, they become problematic when explanatory weight is placed on them and when policies are derived from them. Similar issues occurred with early cluster and RIS research (Martin and Sunley, 2003). The entrepreneurial ecosystem construct has many of the characteristics of a chaotic conception: first, it is tautological in that EE are defined as those which demonstrate successful entrepreneurship, and where successful entrepreneurship is apparent there must be a strong entrepreneurial ecosystem; second, it presents a laundry list of factors and characteristics with no reasoning of cause and effect nor of how they cohere; and third, there is confusion over the appropriate level of analysis, whether at city, region or nation or at some non-spatial unit such as the corporation, sector or global production system (Stam 2015).

Construing ecosystems as complex categories can allow for more conceptually robust and relevant applications. In moving from a chaotic but possibly descriptive category to a complex analytical one we adopt a process-based perspective on EE. Rather than seeing ecosystems as tangible 'things,' they can be better understood as ongoing processes through which entrepreneurs acquire resources, knowledge, and support, increasing their competitive advantage and ability to scale up. As these new ventures grow, they strengthen the overall EE. In this sense we can talk about ecosystem processes—the mechanisms through which startups and scale-ups receive a competitive edge from their regional environment—as well as ecosystems *as* processes: the ways in which ecosystems are reproduced and transformed over time.

Developing such an approach provides an important point of differentiation between ecosystems and prior theories on clusters and RIS and helps develop our understanding of high-growth entrepreneurship as a contextually-embedded phenomenon. In this section we use insights from the cluster and RIS literature to develop research propositions about the processes underlying the creation and reproduction of ecosystems. Analyzing these processes provides a way to distinguish between well-functioning and poorly-functioning ecosystems based on both the amount of entrepreneurial resources in an ecosystem as well as the processes through which these resources flow between entrepreneurial actors without resorting to the tautology of defining ecosystems based on firm formation rates. In this section we develop three sets of research propositions with the goal of creating a broader research agenda to understand ecosystems as ongoing processes of resource creation, flow, and transformation.

5.1 Resource Acquisition and Flow

The legacy of failed government-backed venture capital and venture support programs suggests that the presence of resources like investment capital or knowledge

producers alone does not guarantee entrepreneurial success (Minniti 2008; Audretsch et al 2007). For resources to be useful, entrepreneurs must be able to access and use them as they flow through social networks. These resources are critical for firms to effectively scale up but it cannot be assumed that all entrepreneurs are equally able to access and use these resources. Their positions within social networks, their internal capabilities, their perceived legitimacy as entrepreneurs, and their personal characteristics will affect their ability to draw on resources in an ecosystem. Important entrepreneurial resources are often bound up in social networks, making it difficult for entrepreneurs to acquire if they have not established trust within the community. As suggested by the cluster and RIS literature, localized social networks are an important way that entrepreneurs access the flows of knowledge and other resources within their ecosystem. (Casper, 2007).

It is likely that entrepreneurs who actively develop networks within a region's entrepreneurial community by attending events and developing social bonds with other entrepreneurs will appear to be more legitimate members of the community, making it easier for them to access ecosystem resources. However, those who do not 'appear' to be high-growth entrepreneurs because of factors such as gender, age, ethnicity, disability, or their unwillingness to interact with other members of the startup community may find it harder to engage with the ecosystem (de Clercq and Voronov, 2011). Accordingly, not all entrepreneurs experience the ecosystem in the same way, and an entrepreneur might also decide to reduce their participation in the ecosystem if they feel their time is better spent building the business internally.

It follows from the importance of social networks within the entrepreneurship process that entrepreneurs who engage with the ecosystem and build dense, trust-based local social networks should increase their ability to acquire resources such as knowledge, financing, human capital, and market leads, helping to improve their survival and competitive

advantage. While similar arguments have been made in the cluster literature (e.g. Giuliani, 2007), this has focused more on the strategic decisions made by large firms to engage with other actors in a cluster rather than the more daily practices entrepreneurs employ use within their ecosystem.

Public sector actors, universities, and philanthropic groups may also play an important role in creating the forums and events that bring entrepreneurs together and help them build their networks, as noted in the RIS literature. Hosting talks by prominent business people or more intensive training sessions with a cohort of entrepreneurs at similar stages helps create a space for entrepreneurs to engage with their ecosystem and build legitimacy within their networks, which may aid entrepreneurs in obtaining new knowledge and resources going forward.

This suggests a set of key research questions to establish the role of ecosystems in supporting the competitive advantage of high growth firms and the ways in which entrepreneurs engage with their ecosystem:

Proposition 1a: Firms that are better able to access the resources of the ecosystem will be more competitive than those that are not.

Proposition 1b: Entrepreneurs' ability to access the flow of resource within an ecosystem depends on their perceived legitimacy as high-growth entrepreneurs within the community.

Proposition 1c: Entrepreneurs will display a continuum of ability and willingness to engage with their ecosystem, which will affect their ability to benefit from the resources in the ecosystem.

Proposition 1d: The extent to which the public sector creates opportunities for entrepreneurs to come together will be reflected in the level of development of an entrepreneurial ecosystem.

5.2 Creation and Recycling of Entrepreneurial Resources

Key ecosystem resources such as entrepreneurial knowledge, financial capital, successful mentors, and skilled workers, are created or attracted over time by entrepreneurial activity and public investment. As successful entrepreneurs exit, the resources 'recycle' throughout the ecosystem where they can be used by others. Recycling is a key process of resource flow within ecosystems. Entrepreneurs who have founded and grown a new venture to the point where they can successfully exit it rarely leave the ecosystem after their success (Bahrami and Evans, 1995). They are more likely to "leave their company either immediately or soon after the sale and channel a portion of their newly acquired wealth and time as well as their accumulated experience into other, often multiple, entrepreneurial activities with clear economic benefits" (Mason and Harrison, 2006 p. 58). Successful entrepreneurs often remain in the ecosystem as angel investors, serial entrepreneurs, dealmakers, or advisors. Entrepreneurs and early-stage employees of a successful firm gain valuable experience and legitimacy after exiting that can help them attract support and investment for their future endeavors (Toft-Kehler et al., 2014). An exit by acquisition or initial public offer might spur spinouts or investment activity by employees who owned stock options, further spreading entrepreneurial resources throughout the ecosystem. These successes also help build and reinforce an entrepreneurial culture in the region and encourage others to start their own firms. This is similar to the way in which some clusters develop out of initial successes that help attract new workers, talent, and business to a region, creating new localization economies (Feldman, 2001).

The knowledge, skills, and talent associated with failed ventures also recycle through the larger ecosystem. Entrepreneurial failure is often a function of market timing rather than poor technology or managerial skill, meaning that failed entrepreneurs can gain valuable experience. Workers at failed ventures are also released back into the workforce, taking with

them the skills and insights they developed at their former jobs. Indeed, many clusters were originally seeded by the collapse of a major employer (Corona et al., 2006). However, the recycling of talent and knowledge from failed firms depends on a local culture that does not punish failure but instead treats it as a learning experience. If cultural attitudes punish failure too much, entrepreneurs associated with failure will not be able to use the knowledge and skills they developed again (Cardon et al., 2011).

Based on this, we develop a further research proposition:

Proposition 2: Entrepreneurs in successful ecosystems will be able to take advantage of the knowledge, talent, and other resources produced by previous rounds of successful and failed entrepreneurship.

5.3 Creating and Sustaining Entrepreneurial Resources

Recycling speaks to more than the flow of resources within an ecosystem; it also shows how these resources persist over time. The human capital, skills, and networks produced by successful (or even failed) entrepreneurship are bound up within people. While the media has created a vision of the entrepreneur as a digital nomad who is equally at home at a Berlin café or a Brazilian beach, entrepreneurs are often tied to a particular place due to their social and family bonds. While there is little data about the migration of entrepreneurs after a successful exit, existing work has shown that entrepreneurs who have lived in a place longer and who have deeper social ties there tend to be more successful (Dahl and Sorenson, 2012). The depth of entrepreneurs' social ties to their community suggests that after a successful exit they will tend to stay in the region, ensuring that the capital, knowledge, networks, and know-how created by their successful venture remains in the ecosystem through serial entrepreneurship or mentorship and investment in newer generations of entrepreneurs. It also highlights the important imprinting effects of contexts, the ecosystem technology and institutional infrastructures that imprint on the structures and practices of the

new venture. While financial capital is more mobile than people, it too may display some stickiness. Entrepreneurs and early employees who profit from a successful exit may return as angel investors, and the returns to existing angel investors may be reinvested in new rounds of local startups.

However, this should not be interpreted as a linear accumulation of resources. There will always be some leakage of resources out of the ecosystem as capital, people, and institutions leave. Endogenous shocks such as the collapse of a major employer or exogenous shocks such as a global financial crisis can accelerate the flow of resources out of an ecosystem. For example, the dot-com collapse of the early 2000s lead to a long-term decline in technology entrepreneurship in Ottawa, which resulted in the out-migration of investors, entrepreneurs, and highly skilled technology workers (Spigel, 2011). Less developed ecosystems may see an outflow of resources as entrepreneurs realize they must leave the region to successfully grow their firm because of a lack of available investment capital, demands from investors that they relocate, or the need to move to larger labor markets to tap the talent they need. Accordingly, we identify the following propositions to guide further research:

Proposition 3a: Barring exogenous or endogenous shocks, more of the resources produced by or attracted to well-functioning ecosystems will tend to stay there than will be the case for poorly functioning ecosystems.

Proposition 3b: Well-functioning entrepreneurial ecosystems will be characterized by stronger positive imprinting effects on entrepreneurs and new ventures of their technology and institutional infrastructures

Proposition 3c: The recycling of entrepreneurial resources in less developed ecosystems will be hampered by the loss of firms, entrepreneurs, capital, and other resources to stronger entrepreneurial communities.

As illustrated in Figure 1, the three processes of the resource creation, recycling and flow of resources between actors such as high growth firms, anchor firms, universities, and other regions drive the evolution and transformation of EE. In nascent ecosystems, there are few bonds between entrepreneurs or high-growth ventures, meaning that there are few vectors for resources to flow between entrepreneurial actors. This is due both to a lack of resources as well as the absence of a culture that encourages this kind of interaction. As the ecosystem strengthens through entrepreneurial success, new resources are created through firm exits, up-skilling of the workforce, and the formation of new organizations and new resources are attracted from outside the region in the form of in-migration and inbound investment. Over time, this helps to solidify an entrepreneurial culture that helps sustain the ecosystem and attract even more resources, entrepreneurs, and workers to the ecosystem. As connections strengthen between ecosystem actors, this creates a resilient ecosystem that can weather challenges such as the loss of a major anchor employer, an exogenous economic shock, or the chance of a technological paradigm. However, as suggested above, it is possible for an internal or external shock to sever these connections and depress an entrepreneurial culture and community, leading many of the most important resources and entrepreneurs to flow out of the weakened ecosystem.

Figure 1 Around Here

6. Strength and Functionality of Ecosystems

Our previous arguments have stressed that both the resources available in an ecosystem as well as the strength of the networks through which these resources flow are key for understanding the overall strength and functionality of ecosystems. The processes through which resources are created and flow through an ecosystem are key to understanding how to supports high-growth entrepreneurship. The sparseness or munificence of an ecosystem refers to the aggregate amount of resources available within it Munificent ecosystems are rich in

entrepreneurial resources such as financing, entrepreneurial knowledge, skilled workers, and experienced mentors. As argued above, entrepreneurs who can access these resources are likely to gain a competitive advantage over those outside the region without access to such resources. Sparser ecosystems lack these resources, either because they have not yet been created or attracted through previous rounds of successful entrepreneurship or because the resources that were once presence have leaked out after protracted shocks. Thus, it is likely that firms in sparse ecosystems will have a harder time surviving and scaling up than similar firms in more munificent ecosystems.

The functionality of an ecosystem is determined by the ability of entrepreneurs to access the resources within an ecosystem. Well-functioning ecosystems refer to ecosystems with dense networks between entrepreneurs, investors, advisors, and other key actors based on long-term trust and a localized culture which encourages networking and connecting. This structure supports the flow of resources within the ecosystem, making it easier for entrepreneurs to access them. On the other hand, poorly functioning ecosystems lack dense social networks that allow entrepreneurs to access the critical resources. This may because of a lack of trust in the community or because of cultural outlooks that discourage intensive networking between entrepreneurs and other actors. As a result, entrepreneurs may find it difficult to access resources outside of their immediate based network of family of friends, including critical entrepreneurial knowledge and information about new market opportunities. This suggests that the flow of resources in the ecosystem is as important for its success as their presence. This emphasizes the necessity of understanding the processes through which resources are created or attracted to an ecosystem and the processes by which entrepreneurs access these resources within their local ecosystem.

As shown in Figure 2, based on these distinctions there are a variety of different ecosystems beyond the often studied ‘strong’ ecosystems such as Silicon Valley (I). We can

also can envision ecosystems that are resource-poor (e.g. sparse) but have dense networks to spread what resources do exist. Entrepreneurial ecosystems in developing economies such as Accra, Ghana or Lagos, Nigeria are often cited as examples of this (Sheriff et al., 2015). These 'arid' (II) ecosystems lack traditional entrepreneurial resources such as venture capitalists or strong public support for high-growth technology scale-ups, the presence of strong networks between entrepreneurs, early stage investors, and the diaspora create the opportunity for the ecosystems to create and capital new resources created through successful entrepreneurship which may strengthen over time (Lingelbach 2016).

Similarly, ecosystems can be munificent in terms of their available resources but have poorly functioning networks that impede the entrepreneurial learning, sharing, and cooperation that occur within ecosystems (III). Energy-driven regional economies such as Calgary, Canada (Spigel, 2017) and Aberdeen, Scotland (Cumbers et al 2003) are examples of these 'irrigated' ecosystems: although they have high rates of entrepreneurship due to the many opportunities in the booming and oil gas industry, the competition and rivalry within the industry makes it difficult for entrepreneurs to effectively learn from each other. While they may have high startup rates and successes, the weak networks mean that the ecosystem lacks resiliency. When the industry goes into cyclical decline many resources in the ecosystem such as investment capital and skilled workers may exit, significantly weakening it.

Finally, sparse, poorly functioning ecosystems are those regions which have either suffered substantial economic shocks that have both resulted in significant outflow of entrepreneurial resources and loss of connectivity due to a lack of trust, lack of time to invest in creating a strong community of entrepreneurs, or a shift in the region's culture. These ecosystems can be characterized as 'weak' (IV) due to their limited resources and connectivity. Examples of this might include de-industrialized regions such as Hull in the UK

or Youngstown, Ohio. While successful entrepreneurship can and does occur in such regions, it is difficult for these regions to capture and retain the resources created here through successful entrepreneurship without substantial public support.

Figure 2 here

Entrepreneurial ecosystems should not be defined by their overall levels of entrepreneurial activity or firm formation. This is a circular argument that confuses cause with effect. Rather, EE can be seen as ongoing processes through which resources develop within an ecosystem, flow between entrepreneurs and other actors, and create or attract more resources over time, changing the overall structure of the ecosystem. We predict that ecosystems rich in entrepreneurial resources (strong) and with a structure that facilitates the flow of these resources (well-functioning) will see higher rates of innovative, growth-oriented entrepreneurship that will contribute to resilient economic growth.

7. Ecosystems, Policy, and Prosperity

The largest policy challenge of EE is how entrepreneurs and the state can support the development of a strong, well-functioning entrepreneurial ecosystem. Many of the important characteristics of a strong, well-functioning ecosystem—its culture, its network of successful entrepreneurs and mentors, and its stores of entrepreneurial knowledge—emerge from entrepreneurs themselves. Most important of these is a localized culture that and encourages risk-taking, network development, trust, and learning (Argote and Miron-Spektor 2011). However, it is extremely difficult to build such a culture through outside intervention. From an ecosystems perspective, the proper role of the state is to cultivate the entrepreneurial community and culture that will eventually help to produce and reproduce these resources rather than trying to create them from scratch. Audretsch (2015) refers to this as the 'strategic management of place:' a focus on cultivating the resources and communities that already exist rather than trying to create new resources through top-down intervention. Some aspects

such as culture of risk taking and innovation, cannot be created but can only develop over a period of time through entrepreneurial activity and success while other aspects can be cultivated through enabling entrepreneurial actors to build a strong community.

From an ecosystem-based policy view, instead of trying to outright increase the number of new firms created through public investment, the state might take on a less direct role by supporting community dealmakers in their efforts to create denser networks between entrepreneurs, supporting forums and events for entrepreneurs to meet, and helping actors in the ecosystems identify the challenges they are facing and seeking to build consensus around how to address them. Cultivating the resources that already exist in an ecosystem helps to support ongoing entrepreneurial activities, the success of which will help attract other resources and over time help to foster a more entrepreneurial, innovative culture in the region. State interventions like public venture capital investments, building incubators, or training schemes can add resources to an ecosystem, making it stronger in our model but without sufficiently thick networks between entrepreneurs based on a supportive culture (that is to say, a well-functioning ecosystem), these resources will likely have limited impact. Thus, the creation of strong, well-functioning ecosystems depend on leadership from the entrepreneurial community to create cohesive and dense networks based on a culture of trust, reciprocity, and risk taking.

More broadly, Stam (2015) reminds us that the creation of value for societies is at the heart of the ecosystems concept. Within the framework, this value is created by high-growth entrepreneurs in tradable sectors who create jobs, attract capital to the region, and otherwise benefit a region's tax base. However, it is not a given that improving a region's entrepreneurial capacity necessarily increases overall prosperity or quality of life. We must also recognize that the type of growth that strong EE create may have a 'dark side' that decreases the quality of life of those unconnected with the startup economy by sparking

gentrification, increasing the cost of living, or driving out other types of employment. Entrepreneurial ecosystem policies are not ends in themselves; they must be designed with an eye towards increasing the overall prosperity of a place rather than furthering regional inequality.

8. Conclusion

Entrepreneurial ecosystems hold great promise as both a conceptual framework to understand the relationships between the entrepreneurship process and its local environment and as a policy tool to help regions catalyze sustainable, entrepreneurship-led economic development. However, our understanding of EE is currently driven by observations of successful ecosystems rather than through rigorous social science research. Contemporary work on EE within both popular business literature and academic research lacks a strong theoretical foundation, making it a chaotic concept and reducing its ability its generalizability and policy relevance.

This paper makes several contributions to the ecosystem literature. First, we have created a stronger conceptual basis for EE and distinguished it from related concepts such as clusters and RIS. While ecosystems build on these theories, we have shown that they differ regarding both the agent of action—the entrepreneur as opposed to the state—and the relative importance of different resources. Entrepreneurial ecosystems point to the importance of entrepreneurial resources, such as knowledge of how to start and grow a business, early-stage investment capital, entrepreneurial mentors, and employees used to startup environments. While these resources may be present in existing work on clusters and RIS, they are not the core of how they contribute to sustainable competitive advantage.

Second, we have developed a process-based perspective to create a framework to better understand how ecosystems develop, evolve, and deliver benefits to entrepreneurs. Much of the extant research on EE is static and cross-sectional rather than longitudinal in

nature. We have argued that it is important to understand how resources flow within the ecosystem, how these are produced by internal mechanisms such as recycling of both successful and unsuccessful ventures, and how they can also be attracted into the ecosystem by the global pipelines entrepreneurs create.

There is a need for rigorous social science enquiry into both the basic definition of ecosystems to validate the importance of individual attributes and into factors identified by existing research as being crucial components of ecosystems. The propositions discussed here provide direction for a future empirical research agenda for EE which can provided a more robust basis for the development and effective implementation of public policies that respond to Stam's (2015) call for more theory- and evidence-led policy making. For example, the role of entrepreneurs as the best 'leaders' of ecosystems as opposed to the state needs to be empirically validated in order to inform policy development.

Beyond this, more attention should be paid to the processes through which ecosystems deliver benefits to entrepreneurs and startups: how they encourage the creation of high-quality ventures and give these firms some sort of competitive advantage that helps them grow and thrive. We must unpack the ecosystem to better understand how entrepreneurs actually gather resources and support from an ecosystem and whether this is a homogeneous process or whether entrepreneurs in different industries or at different stages of their lives or careers interact with the ecosystem in different ways. Finally, we must approach the topic of ecosystems critically, aware that not everyone benefits from an ecosystem equally: entrepreneurs can be excluded from many local networks because of their gender, race, age, or level of education. A more holistic examination of EE will help researchers better understand the relationships between geography, personality, and the entrepreneurial phenomenon and contribute to more effective policy solutions to encourage sustainable and resilient entrepreneurship-led economic growth.

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Table 1: Differences Between Entrepreneurial Ecosystems and Cluster/RIS Theory

Theme	**Clusters & RIS**	**Entrepreneurial Ecosystems**
Role of the state	State plays a prominent role as the lead organizer for support programs and brings competing actors together in order to create public goods. Significant investments in research or coordination organizations.	Ecosystems are primarily led by entrepreneurs, particularly around the creation of networking and support organization and identifying critical needs. State can supplement this role and help provide necessary resources.
Accessing regional resources and benefits	Little differentiation between large firms and smaller startups and new ventures in how firms access local resources. Importance of absorptive capacity in internalizing knowledge spillovers.	Focus on the specific difficulties and opportunities entrepreneurs and startups face in accessing localized resources such as liabilities of newness and lack of internal absorptive capacity.
Role of knowledge	Focus on technical and market knowledge to drive incremental and radical innovation and help expansion into new markets. Frequently the role of knowledge producers like universities or research labs.	In addition to technical and market knowledge, importance of entrepreneurial knowledge in supporting the formation and growth of new ventures and creation of an entrepreneurial culture. University knowledge spillovers are important but less than their role as producers of skilled entrepreneurs and workers.
Key actors	Large anchor firms, public agencies, and universities are the most important actors due to their large stocks of resources and ability to produce and exploit novel technological and market knowledge.	Entrepreneurs are key actors in an ecosystem, with the ability to identify challenges and help create structures to overcome common problems. Other actors such as existing firms who can draw on ecosystem resources to catalyze new growth, startup workers, mentors, advisors, and dealmakers are also crucial constituencies.
Industry	Importance of knowledge flows within industries to reduce costs and between industries to catalyze radical innovation.	Ecosystems focus less on industry or market and more on underlying technology (e.g. digital technology. Entrepreneurial knowledge largely transcends industry structures and lack of direct competition encourages cooperation.

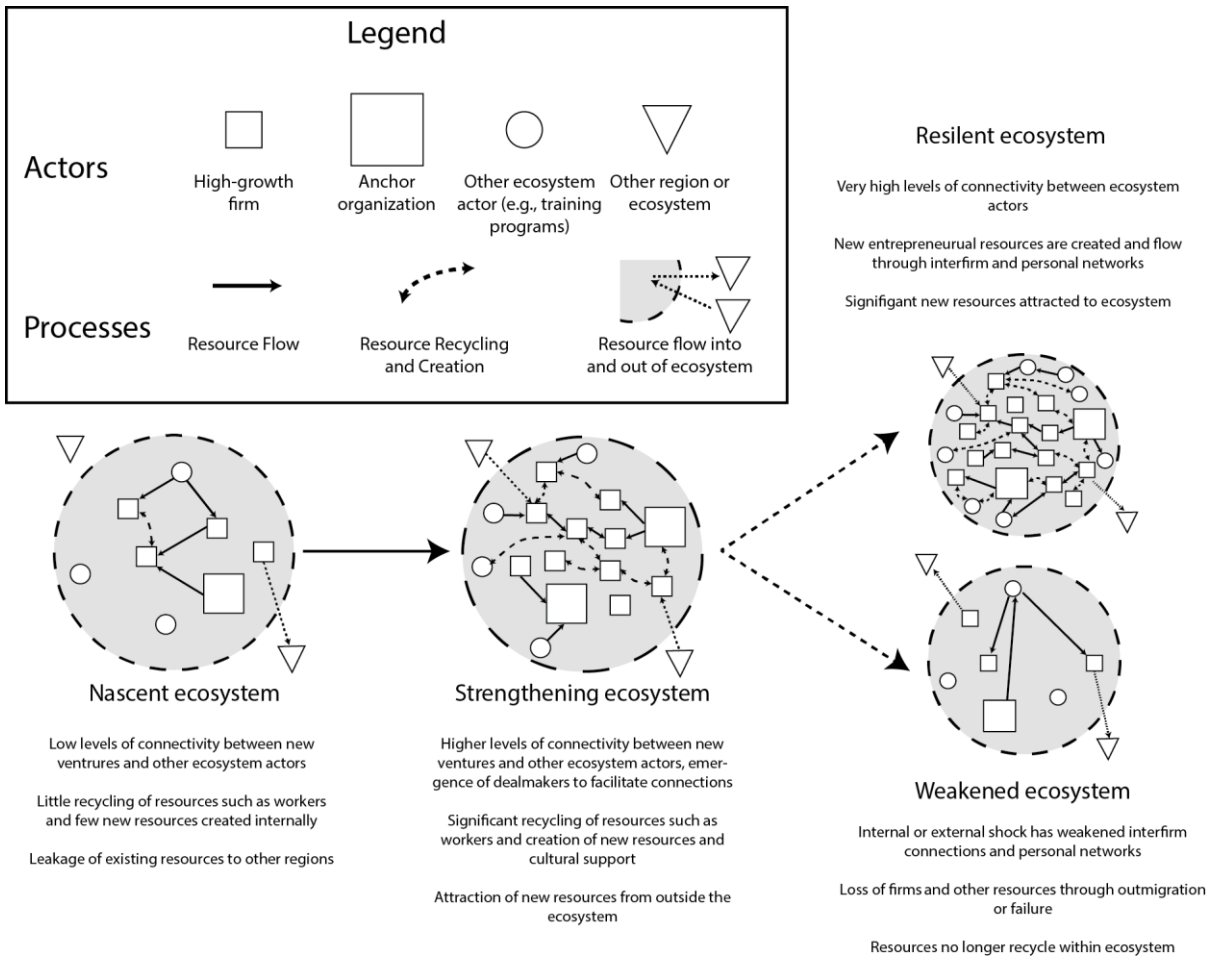

Figure 1: Transformation of Entrepreneurial Ecosystem

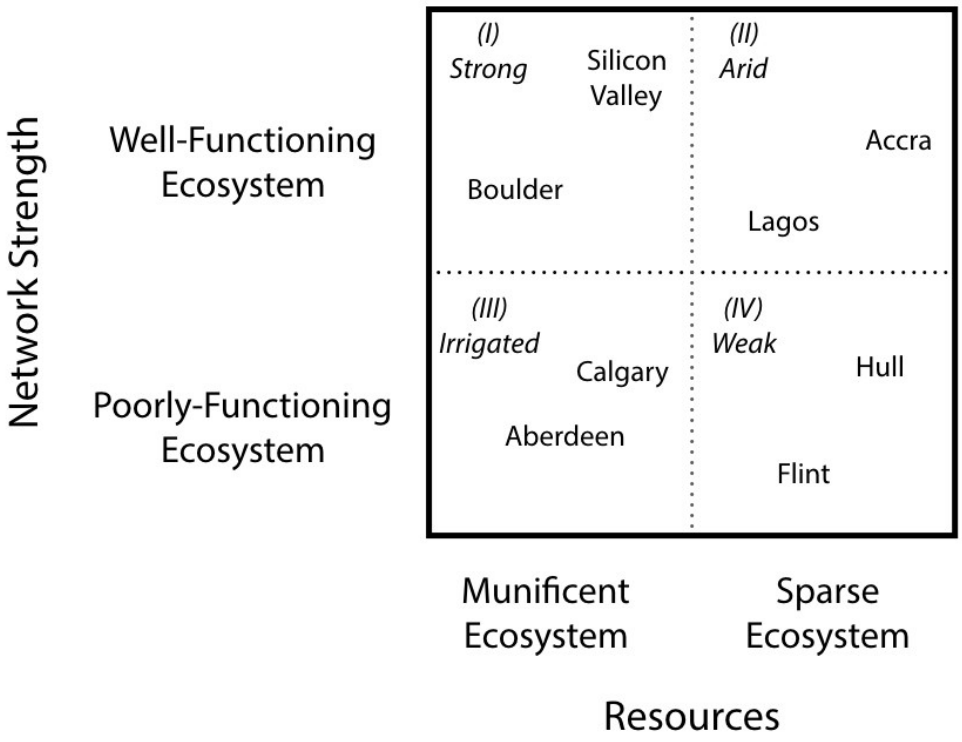

Figure 2: Representative Schematic of Ecosystem Types